

STATE OF ALASKA

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ANNUAL REPORT OF PROGRESS, 1960-1961

FEDERAL AID IN FISH RESTORATION PROJECT F-5-R-2

SPORT FISH INVESTIGATIONS OF ALASKA

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## Introduction

This report of progress consists of the Job Completion Reports from the State of Alaska's Federal Aid in Fish Restoration Project F-5-R-2, "Sport Fish Investigations of Alaska".

The current Project is composed of eighteen separate studies and were designed to evaluate the various aspects of the State's recreational fisheries resources. The information gathered will provide the necessary background data for the development of future programs. During the current segment continued emphasis was placed on overall inventorying of accessible waters and the evaluation of general catch data.

Several problems of immediate concern appeared sufficiently defined to warrant independent studies. As a result, two independent creel censuses, one experimental silver salmon egg take and a Resurrection Bay area silver salmon population study were instigated. Data accumulated from prior jobs dealing with the Arctic grayling has resulted in the formulation of three separate investigations during the current segment.

The rapid expansion of Alaska's population is being reflected in the ever increasing numbers of "No Trespassing" signs encountered in the vicinity of population centers. Fortunately, much of Alaska's fishing waters are still in the public domain. An aggressive program of acquiring access to fishing waters, instigated in 1959, was continued during the present segment. Increased emphasis is being placed on this job and the successful continuation of this activity, now and in the immediate future, will forestall many of the serious recreational use problems currently facing other states.

The enclosed progress reports are fragmentary in many respects and the interpretations contained therein are subject to re-evaluation as the work progresses.

ANNUAL REPORT OF PROGRESS  
INVESTIGATIONS PROJECTS  
COMPLETION OF 1960 - 1961 SEGMENT

State: ALASKA

Project No: F-5-R-2

Name: Sport Fish Investigations  
of Alaska

Job No: 2-A

Title: Creel Census and Popu-  
lation Sampling of Sport  
Fishes in Southeast Alaska

Period Covered: July 1, 1960 to April 15, 1961.

Abstract:

Sampling of the sport fisheries of Southeastern Alaska was continued for the second year. Several different censusing techniques were utilized to obtain data throughout the area. Population sampling was conducted at Auke Lake by the use of gill nets.

A random type creel census at Auke Lake disclosed 388 anglers fished for 507 hours to catch 371 fish. Gill netting prior to the entrance of migratory fish indicated the resident sport fish population to consist of dolly varden and cutthroat trout.

A semi-voluntary type creel census was conducted on 20 lakes and streams scattered throughout the area. As was expected the catch per hour was lowest in waters easily accessible and highest in the remote areas.

A random sample creel census of eight sport fishing locations along the Juneau highway system disclosed 1,407 anglers fished these waters for 1,980 hours to catch 2,462 fish.

Insufficient data has been collected to date for complete evaluation of the creel census and population sampling.

## Objectives:

To investigate and measure the sport fish population trends and fishing success in Auke Lake, (Juneau) and other waters which are readily available to Southeastern Alaska's anglers.

To evaluate the effect of management procedures currently applied to these sport fishing waters.

To provide recommendations for the management of these waters.

## Techniques:

Background information from prior studies, conducted by the Bureau of Sport Fisheries, U. S. Fish and Wildlife Service, the Alaska Department of Fish and Game and other agencies, was reviewed. The information given in these reports, along with unpublished data and local knowledge, was utilized to direct the course of this investigation.

Creel census and population sampling were conducted in several of the more accessible sport fishing areas in Southeast Alaska. Three factors influence the recreational utilization of ponds and streams in this portion of the state: (1) Their great number and wide distribution; (2) The high cost of boat or plane transportation (the only means of reaching the majority of these waters); and (3) The low human population density. These combined factors result in a light angling intensity on most waters. The exceptions to this light pressure are waters located adjacent to the existing road systems.

Auke Lake is one of the few readily accessible lakes in the Juneau area and is subjected to heavy angling pressure. An intensive creel census and population sampling program was undertaken on this lake. The creel census was designed to sample one-third of each day checked, i.e., 0000-0800, 0800-1600 and 1600-2400. Three weekdays and two weekend days were censused each week. The week days were rotated so no one day would be missed two weeks in succession. (Table 1). The data collected included species, number and size of fish caught and hours fished. Scale and stomach samples were

Table 1. Creel Census Sampling Design, Auke Lake, 1960.

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
June 5-11	-	-	-	C	A	B	B
June 12-18	A	B	C	X	X	C	C
June 19-25	B	X	A	B	C	X	A
June 26- July 2	C	A	X	X	A	B	B
July 3-9	A	B	C	A	X	X	C
July 10-16	B	X	X	B	C	A	A
July 17-23	C	A	B	X	X	B	B
July 24-30	A	X	C	A	B	X	C
July 31- August 6	B	C	X	X	C	A	A
August 7-13	C	A	B	C	X	X	B
August 14-20	A	X	X	A	B	C	C
August 21-26	B	C	A	-	-	-	-
Work Periods:	A = 0000 - 0800 hours B = 0800 - 1600 hours C = 1600 - 2400 hours X = Day Off						

taken when feasible. Supplementary information as to type of fishing (shore or boat casting, trolling, etc.), license class (resident or nonresident, hunting and fishing combination or plain fishing), sex of angler and general comments were also recorded. The census covered the period from June 8, 1960 to August 23, 1960 - a total of 77 days of which 20 were non-working days.

Graduated-mesh sampling gill nets were set in Auke Lake to sample the resident population. These sets were made prior to the entrance of adult salmon into the lake system. No further netting was performed during the period adult coho, pink and chum salmon occupied the lake.

Semi-voluntary creel census and population sampling of a less intensive nature was conducted on 20 other lakes and streams supporting appreciable recreational fishing. The voluntary return boxes used were the same as described in the 1959 progress report. The location of the boxes ranged from waters easily accessible from roads to remote areas reached only by aircraft. An attempt was made to locate the voluntary return boxes in places where they would not be subject to malicious mischief or animal destruction (bears). Checks were made, using airline charter records and actual observation, to determine the percentage of anglers utilizing the voluntary return boxes.

An extensive creel census was designed for waters readily accessible from the Juneau road system. A temporary creel census worker was hired in May to cover these waters at the start of sport fishing season. This census covered the period from May 28 to August 28, a period of 93 days of which 68 were censused. A regular tour of the various waters was conducted in the A.M. and P.M. hours. Waters included in this census were:

<u>Water</u>	<u>Miles from Juneau</u>
Sheep Creek	2 - south
Lake Creek	12 - north
Gold Creek	0
Montana Creek	16 - north
Salmon Creek	2 - north
Glacier Lake	14 - north
Auke Creek	12 - north
Moraine Lake	14 - north

All data obtained were tabulated and total pressure and catch estimated by extrapolation of the hours checked to the total hours of daylight.

A voluntary return box was located on the trail to Salmon Creek Reservoir. This lake is located off the Juneau road system but differs from the other locations checked. To reach this reservoir, the angler must hike three miles and climb, in the process, 1,180 feet. All data obtained from this return box have been tabulated.

A random sampling technique was used in the creel census studies. An attempt was made to establish statistically sound methods adaptable to local conditions. Figures have been gathered and are being evaluated in an attempt to obtain increasingly dependable results.

Fish population sampling was conducted concurrently with the creel census by means of graduated-mesh sampling gill nets. The intensity of sampling on individual waters was determined by their relative importance, as indicated by previous studies, and other background information.

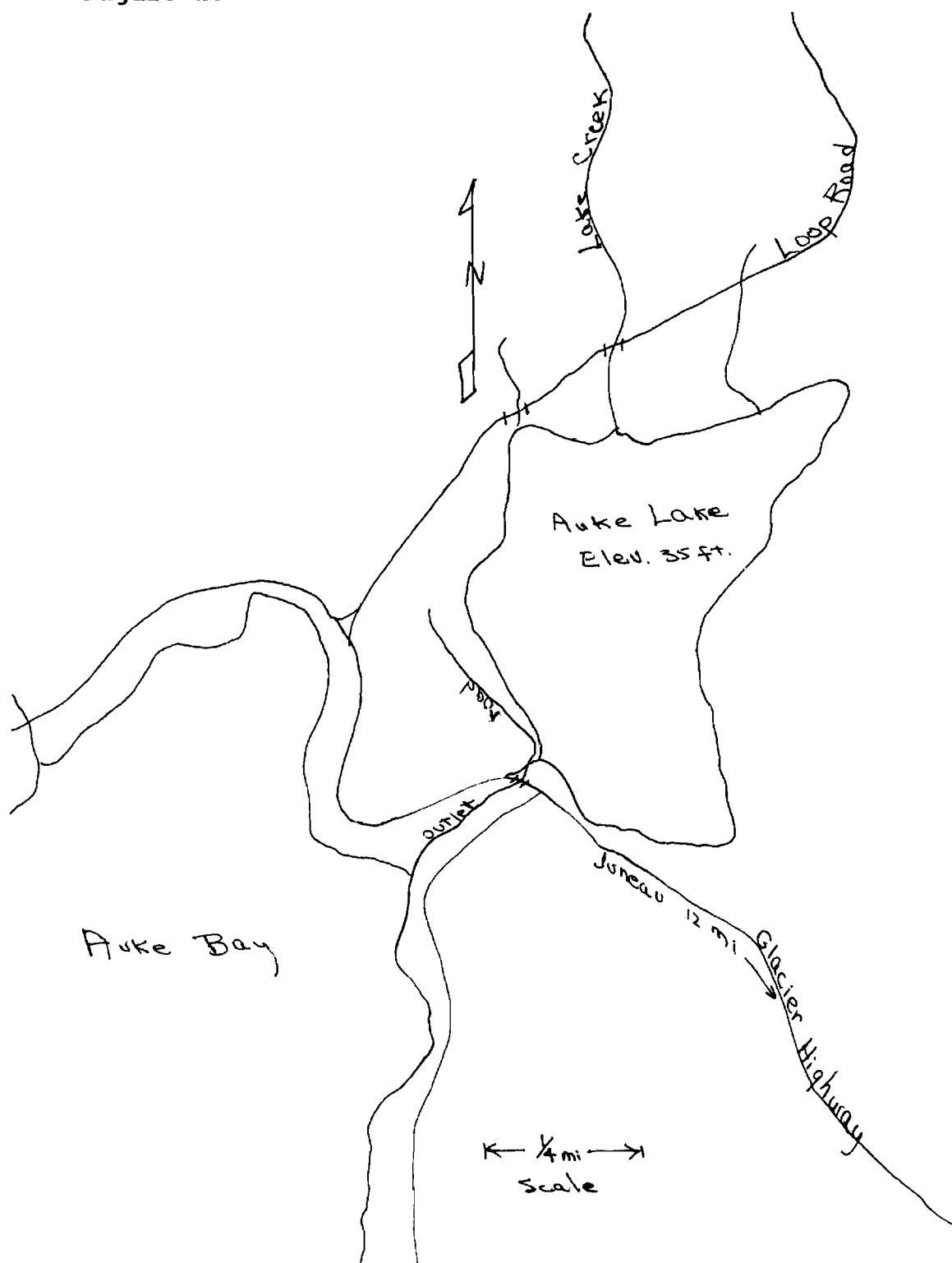
The data gathered is being biologically examined and statistically analyzed to provide information on inter-species and species composition, rates of growth and survival, food composition, sport fish population trends and fishing success.

#### Findings:

##### 1. Auke Lake. Figure 1.

This body of water, 12 miles northwest of Juneau, abuts the Glacier Highway along its southwest shore. It has a surface area of 151 acres and a maximum depth of 103 feet. (Wilding, U. S. Bureau of Fish, 1939). The pH of the lake is slightly acidic, 6.3. Its elevation is 35 feet above sea level. Lake Creek, the major inlet, normally carries a flow of three to six cubic feet per second. This creek has excellent gravel spawning areas which are utilized by all salmonoids associated with the watershed. The outlet, Auke Creek, normally carries a flow of five to 15 cubic feet per second. The fishery in this lake has been declining for the past fifty years. Various attempts in the interim period have been made to rebuild this fishery without the desired results.

Figure 1. Auke Lake





The first creel census ever taken on this lake was established this year (see Techniques). The creel census taker was provided with an eight foot punt and outboard motor which enabled him to contact all anglers on the lake during the sample periods.

Creel census reports were collected and tabulated. On pressure as light as is found here, a catch per unit effort may be figured by using total week days. The data was separated weekends from weekdays and an adjustment index arrived at. Thirty-three per cent of all weekend hours and twenty-one per cent of all weekday hours were sampled. These indices were applied to their respective data and total estimated pressure arrived at. The estimate for non-working days was made by averaging the pressure on the same day of the week the week before and the week following the creel census-taker's day off.

Total estimated pressure for Auke Lake is as follows:

Estimated Fishing Pressure and Catch, Auke Lake, 1960

Angling Pressure:

Total Anglers	388
Total Hours Angled	507
Total Catch	371
Catch per Hour	.73
Average Fishing Effort	1.3
Catch per Angler	.96

Total Catch by Species:

Dolly Varden	348
Cutthroat	15
"Jack" Coho Salmon	8

Size Range by Species:

Dolly Varden	6"-20"
Cutthroat	9"-12"
"Jack" Coho Salmon	12"

#### Type and Sex of Licensee:

Resident Males	311
Nonresident Males	22
Resident Females	45
Nonresident Females	10

#### Method of Angling:\*

Eggs	83%
Spoons	35%
Worms	7%
Plugs	4%

#### Occurrence of Fishing Pressure:

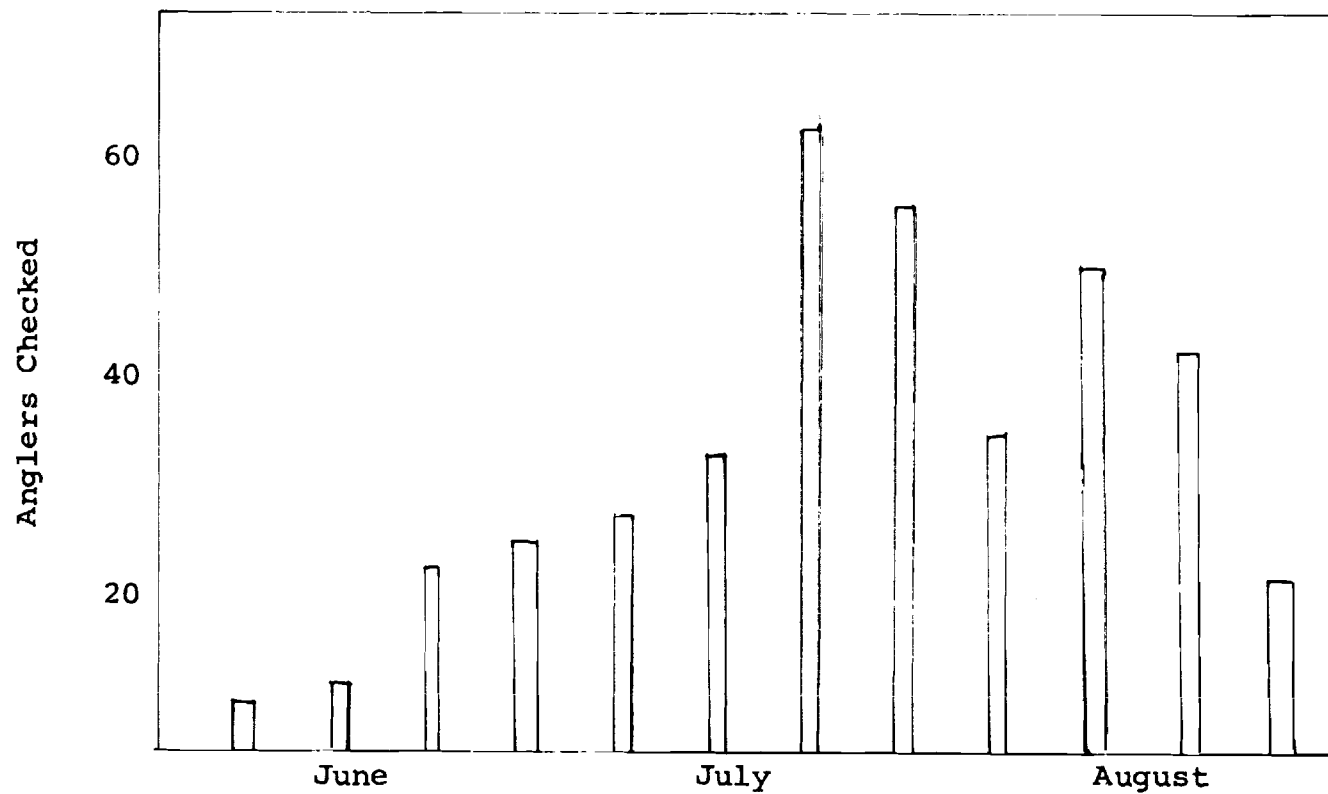
A.M. Effort	62 hours
P.M. Effort	445 hours

\*The excessive total of percentages is caused by 31% of the anglers who used several methods.

As illustrated above, the catch was largely dolly varden char with cutthroat trout and coho (silver salmon) rounding out the remainder of the catch. Scale samples are being examined to determine if the trout and char were resident or migratory. From the writer's past experience, the cutthroat taken early in the summer are largely resident fish. The dolly varden begin to enter fresh water as stream temperatures begin to rise after ice breaks up. The early dolly varden from Auke Lake appear to be these sea run fish. The silver salmon (coho) attain a size shown in the creel census only after a year at sea. The other species of salmon, known to be in the lake, are not acceptable to the anglers after being in fresh water more than a few days. Fish not appearing in the catch but known to be present during the creel census period were sockeye, pink and chum salmon, cottids and sticklebacks. Grayling, eastern brook and rainbow trout have been planted at one time or another in Auke Lake during the past 20 years but did not appear in the census.

A graph illustrating the fishing pressure at Auke Lake is given in Figure 2. In the graph, the number of anglers checked plus the estimated number fishing on noncensus days was computed by extrapolation and plotted by weekly intervals.

Figure 2. Auke Lake - Fishing Pressure Pattern  
Plotted by totals of weeks.



Prior to the arrival of adult salmon in the lake, population samples were attempted by use of sampling gill nets. Two nets were utilized and 18 overnight sets were made between June 7 and 16. Catches ranged from no fish in five sets to six fish for one set. Of the fish netted, the dolly varden appeared to be sea run, while cutthroat trout appeared to be composed of both resident and sea run populations. The largest cutthroat, an 18-inch recently spawned female, taken June 16 showed no sea growth and appeared to be entering her eighth year.

Stomach samples taken from the gill netted fish revealed pea clams and insect material. Other foods such as salmon eggs, forage fish, etc. are available in Auke Lake.

#### Semi-voluntary Creel Census

A system of voluntary return census boxes were established on the more popular fishing locations in the district. The large number of locations and the scattered pressure they receive, left the drop boxes as the only economical method of collecting data. The location selected ranged from the relatively inaccessible ones to those within walking distance of several communities. The boxes were installed as soon after "ice out" as possible. The census reports were collected from these boxes at the close of the fishing season. (Table 2).

To help in evaluating the actual angler usage, several popular locations were visually checked and the number of anglers there recorded and checked against return slips for that day. Another usage evaluating technique was to check the flight slips of local airlines and record the number of anglers flown to a given location which was also checked against the return slips. These methods allowed the writer to arrive at a use figure believed to be reasonably close to the actual fishing pressure of the district.

Wilson and Patching Lakes were selected for comparing flight sheets against return slips. At Wilson Lake, six reports were collected which accounted for 24 anglers, the flight sheet accounts for 143 anglers, therefore 16.78% of the anglers filled out reports. At Patching Lake, the same technique revealed 30.23% of the anglers filled out reports.

Table 2.

Southeastern Alaska  
Voluntary Creel Census Station Locations and Results  
1960 Season

Location	Near	Time	Reports	C.P.U.E.	Species	Access
Chilkoot Lake	Haines	6/1-11/18	10	.31/hr.	DV, Sockeye	Road
Mosquito Lake	Haines	6/1-11/18	20	.54/hr.	Cutt, DV, Coho	Road
Lower Dewey Lake	Skagway	5/31-8/10	15	3.36/hr.	EB	½ mi. trail
Young's Lake	Juneau	5/23-9/26	8	3.4 /hr.	Cutt, RB	Plane <sup>1</sup>
Admiralty Creek	Juneau	5/23-9/26	3	3.3 /hr.	DV, RB	Boat <sup>2</sup>
Turner Lake	Juneau	5/23-9/26	8	2.2 /hr.	Cutt, DV, Kokanee	Plane or Boat
Hasselborg Lake	Juneau	5/23-9/26	13	1.33/hr.	Cutt, DV, Kokanee	Plane
Castle River	Petersburg	6/9-11/30	9	2.19/hr.	Cutt, DV, Coho	Boat
Kah Sheets Lake and Creek	Petersburg	6/9-11/30	2	2.14/hr.	Cutt, RB, Sockeye	Plane or Boat <sup>3</sup>
Falls Creek	Petersburg	6/10-11/15		Nothing Reliable		Road
Petersburg Lake	Petersburg	6/8-11/30	1	1.9 /hr.	Cutt	Plane or hike <sup>4</sup>
Kunk Lake	Wrangell	6/11-11/30	2	2.5 /hr.	Cutt	Boat <sup>5</sup>
Virginia Lake	Wrangell	6/11-11/30	15	1.63/hr.	Cutt, Sockeye	Boat
Naha River	Ketchikan	6/23-12/31	13	1.43/hr.	RB, DV, Cutt, ST, Sockeye	Boat <sup>6</sup>
Heckman Lake	Ketchikan	6/20-11/30	4	3.31/hr.	Cutt, RB, DV	Plane
Patching Lake	Ketchikan	6/20-11/30	10	.84/hr.	Cutt, DV, RB Kokanee	Plane
Fish Creek	Ketchikan	6/24-8/28	16	1.37/hr.	RB, Cutt, DV	Boat
Wilson Lake	Ketchikan	6/20-11/4	6	1.93/hr.	Cutt, DV	Plane
Upper Checots Lake	Ketchikan	6/20-11/4	3	.27/hr.	RB	Plane <sup>7</sup>
Ward Creek Drainage	Ketchikan	7/8-11/16	18	1.01/hr.	RB, Cutt, DV, Coho	Road

Abbreviations: RB=Rainbow, Cutt=Cutthroat, DV=Dolly Varden, ST= Steelhead, EB=Eastern Brook

\*Footnotes next page.

Table 2. Continued - Footnotes

1. Young's Lake on Admiralty Island near Juneau may be reached by boat and a 5-mile hike.
2. Admiralty Creek near Juneau is the stream that drains Young's Lake.
3. Kah Sheets Bay near Petersburg is the outlet of Kah Sheets Lake 3 miles above.
4. Petersburg Lake may be reached by trail (7 miles) after crossing Wrangell Narrows.
5. Kunk Lake is back from the beach 2 miles by trail.
6. There is a 6-mile trail from the mouth of Naha River Heckman Lake.
7. This lake was barren, planted to rainbow in 1954, and has now "topped off".

The census reports from these two lakes (50) checked against the total angler usage as shown by the flight sheets (229) indicated that only 21.8% of the anglers completed a voluntary creel census report on those waters reached with difficulty or expense.

A visual check was made of anglers using the return boxes at Naka River, Ward Lake, Connell Lake and Fish Creek (all near Ketchikan). This visual check was conducted during July and August. A total of forty-one anglers were observed of which eleven made reports. It is assumed that the census biologist was not recognized and thereby the angler's normal activities were not influenced. In the case of these readily available waters, only 26.8% of the anglers completed voluntary creel census reports.

The angling effort in this category resolved itself into three distinct segments: (1) Road - the effort from road systems close to the centers of population, (2) Boat - the waters available to the large number of people who have boats and utilize them for sport fishing in the more remote areas and (3) Plane - those who fish normally inaccessible waters reached only by aircraft. The catch per hour of these groups has been determined to be: (1) Road - 1.3 fish/hour (2) Boat - 2.1 fish/hour and (3) Plane - 2.1 fish/hour.

No attempt will be made in this report to manufacture total fishing effort figures for Southeastern Alaska from the data obtained to date. Indications are present but the data collected is not adequate to do more than direct further work.

#### Juneau Area Census

This creel census was conducted on popular sport fishing locations readily accessible to the Juneau residents. The census taker was equipped with a vehicle to enable him to cover these locations twice daily. The hours selected for censusing were designed to cover the height of angling intensity in both morning and evening. The experience of the field collector indicates that only 1/3 of the anglers were interviewed and 1/4 of the time they actually fished tabulated during his rounds. All weekend days and 3/5 of the weekdays were sampled. Of the 93 days covered by the census only 68 were sampled. The adjustment indices for weekend days was determined to be .333 on angler number and .25 on angling

hours; for weekdays it was determined to be .2 on angler numbers and .15 on fishing time. Extrapolation of the data collected reveals the following:

Estimated Fishing Pressure and Catch, Juneau Road System, 1960.

Angling Pressure:

Total Anglers	1,407
Total Hours Angled	1,980
Total Catch	2,462
Catch per Hour	1.2
Average Fishing Effort	1.4
Catch per Angler	1.75

Total Catch by Species:

Dolly Varden	2,421
Pink Salmon	15
Cutthroat Trout	11
Rainbow Trout	8
Eastern Brook	7

Size Range by Species:

Dolly Varden (sea run)	6"-23"
Pink Salmon (sea run)	14"-27"
Cutthroat Trout (sea run)	7"-10"
Rainbow Trout (resident)	6"-7"
Eastern Brook (resident)	7"

Type and Sex of Licensee:

Resident Males	1,092
Nonresident Males	166
Resident Females	125
Nonresident Females	24

Method of Angling:\*

Eggs	90%
Spoons	26%
Fly	.08%

\*The excessive total of percentages is caused by 15% of the anglers who used several methods.



#### Angling Pressure Received at the Various Locations:

Salmon Creek	50.9%
Montana Creek	21.8%
Sheep Creek	17.5%
Gold Creek	4.0%
Lake Creek	3.1%
Auke Creek	2.0%
Glacier Lake	.06%
Moraine Lake	.64%

A graph illustrating the fishing pressure from the Juneau Road System is given in Figure 3. In this graph, the number of anglers checked plus the estimated number fishing on non-census days was computed by extrapolation and plotted in weekly intervals. The high fishing pressure experienced during July and August is a result of the appearance of migrating anadromous fish. The fishing pressure decline in late August is a result of the opening of the hunting season and school.

A voluntary return box was installed on the trail to Salmon Creek Reservoir. This box returned 59 usable reports from the period May 22 to August 30. The reservoir is populated with eastern brook trout. Tabulation of the voluntary return reports reveal the following information:

#### Fishing Pressure and Catch, Salmon Creek Reservoir, 1960

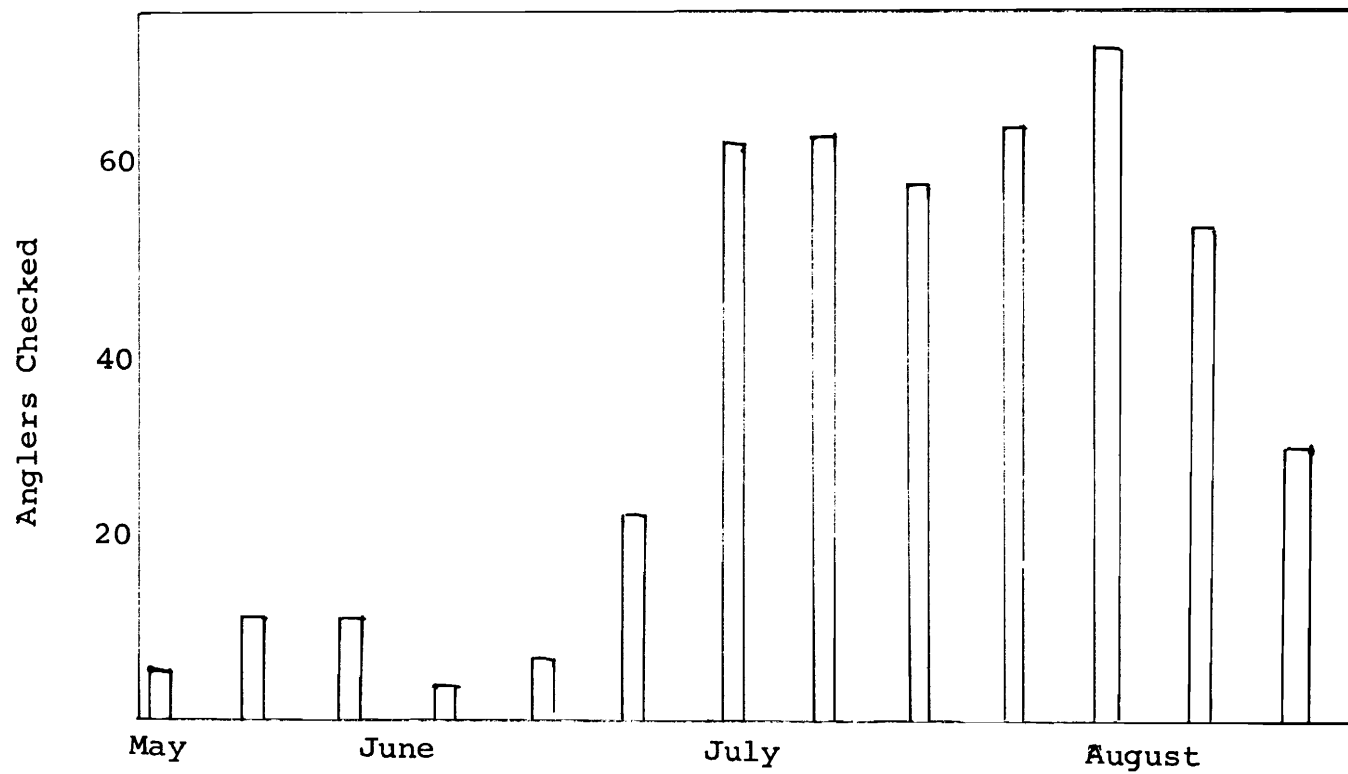
##### Angling Pressure:

Total Anglers	86
Total Hours Angled	425
Total Catch	687
Catch per Hour	1.61
Average Fishing Effort	4.94
Catch per Angler	8.0

##### Size Range of Fish (Eastern Brook):

Range	5"-15"
Average Size	7"-10"

Figure 3. Juneau Road System - Fishing Pressure Pattern  
Plotted by Totals of Weeks.



Type and Sex of Licensee:

Resident Male	63
Nonresident Male	13
Resident Female	6
Nonresident Female	4

Method of Angling:\*

Spoons	52%
Worms	32%
Fly	28%
Eggs	21%
Strips	1%

\*The excessive total of percentages is caused by 31% of the anglers who used several different methods.

Pressure on this reservoir was found to continue into July even though sea run trout were available at the mouth of the creek. This indicates that Juneau possesses a group of anglers that desire eastern brook trout. There is no data available to determine the percentage of anglers using the drop box.

Recommendations:

It is recommended that the creel census activities be continued on representative Southeastern Alaskan waters so that a clearer evaluation of the sport fishery may be obtained.

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15 April 1961

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